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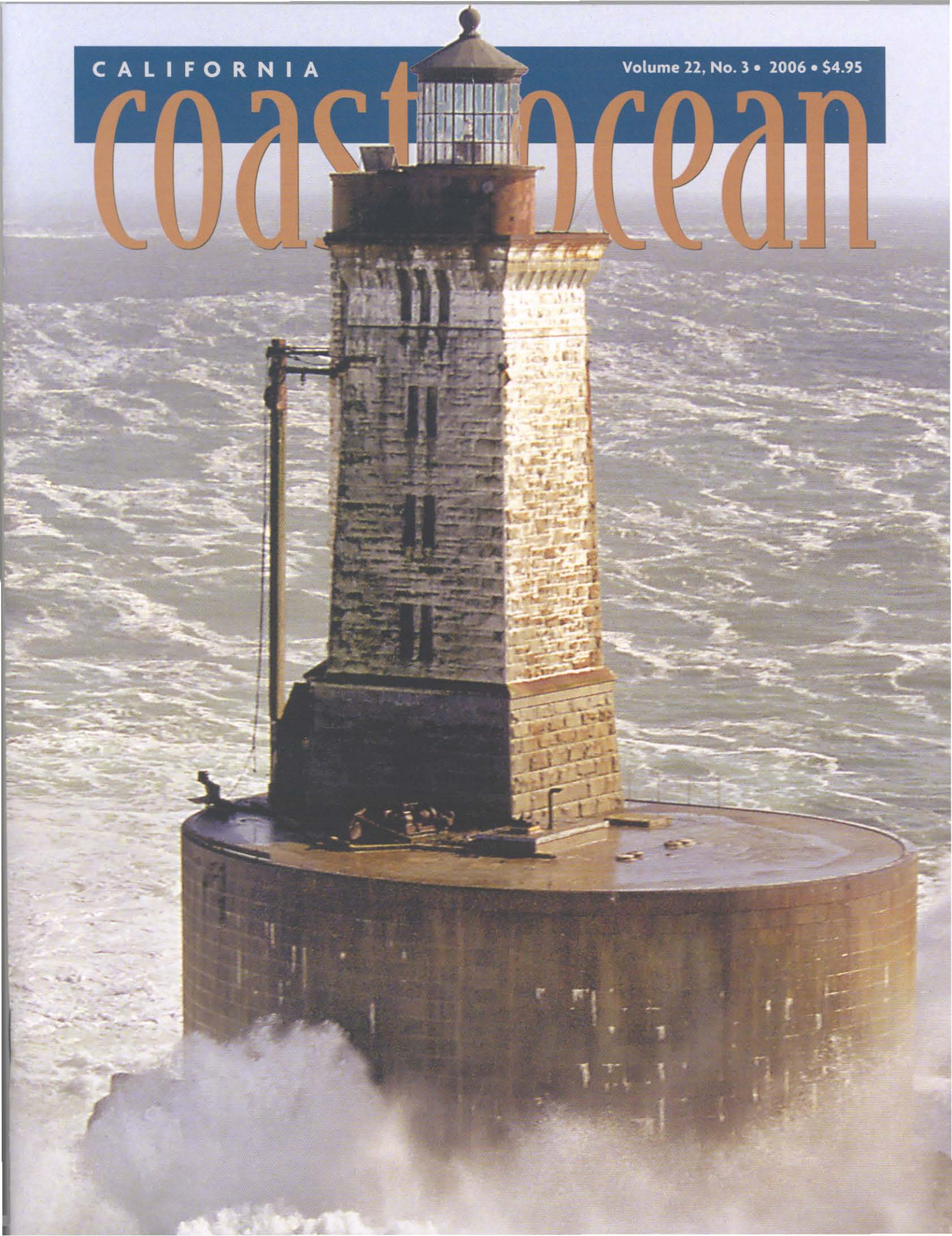

SHIFTING BASELINES

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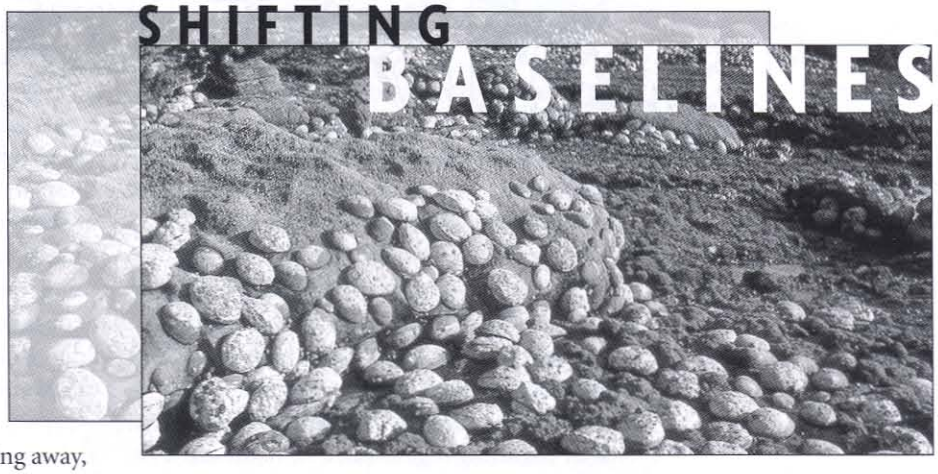


GARY E. DAVIS, NATIONAL PARK SERVICE

Appearances can be deceptive. This 1982 photo shows a seemingly healthy population of black abalone on the southwest shore of Santa Rosa Island. But several hundred years ago—before they were hunted to near-extinction—sea otters would have kept abalone populations in check. Now more than 99 percent of the abalone in the area have been wiped out by bacterial infection.

In 1741, the German naturalist Georg Steller wrote of the fur seals and sea lions on Bering Island, "If I were asked to say how many I have seen . . . I can say without lying that it is impossible to make any computation. They are innumerable." Today, the sea lion named after Steller is listed as endangered in the Aleutians, its numbers down 70 percent worldwide since 1960—from roughly 300,000 animals to 85,000, according to the Seal Conservation Society. The reason? Quite likely, overfishing of a staple food source: pollock. Two other species that Steller was the first to describe, the spectacled cormorant and Steller sea cow, are extinct, hunted into oblivion for their meat.

Threatened species, threatened environments. Every week, it seems, more dire news appears about the state of the oceans. Coral reefs are sliming away, turning into dead zones. Inland bays such as the Chesapeake are being drowned in sediment and excess nutrients. Hawksbill turtles struggle at the edge of extinction. Fisheries are collapsing.

And yet many people think all this is, if not normal, then perhaps inevitable. Not the way it's always been, to be sure, but absent any catastrophic changes—such as volcanic eruptions or tsunamis bring—these slow, chronic, hard-to-notice slides become part of reality as we know it.

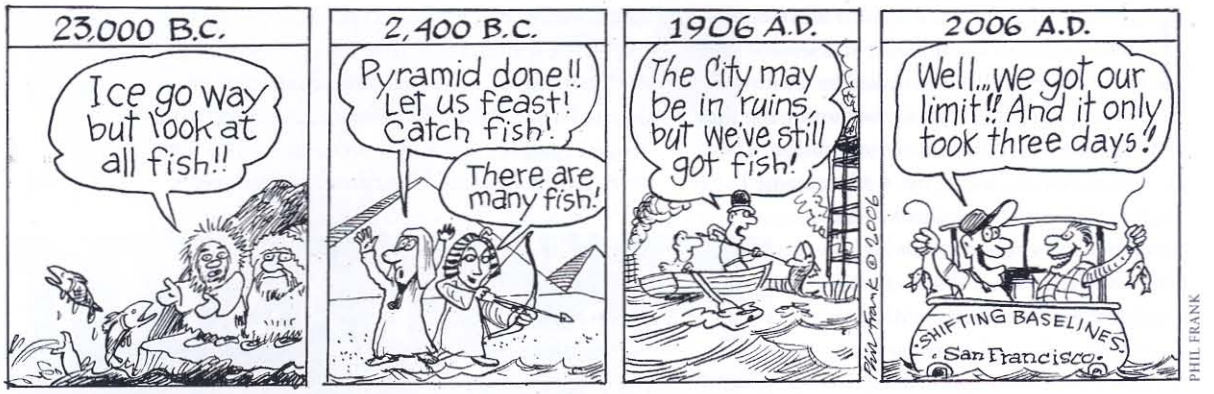
This phenomenon of acceptance has a name: it's called the shifting baselines syndrome, and it is beginning to drive some new thinking in marine conservation.

The term was coined by Daniel Pauly, a Canadian fisheries scientist who happens also to be an outspoken critic of modern fishing practices. In a 1995 paper in *Trends in Ecology and Evolution,* Pauly charged that young biologists fail to address the collapse of once-abundant fishing stocks because anecdotes of immense past catches have little meaning for them. "Each generation," wrote Pauly, "accepts as a baseline the stock size and species composition that occurred at the beginning of their careers." The result is an ever-shrinking sense of possibility, which leads to ineffectiveness, and to continued overexploitation—or, as Pauly puts it, a continued "fishing down the food web" that eventually will leave people with a diet of "jellyfish and plankton soup."

In 2001 in an article in *Science,* Jeremy Jackson, a marine ecologist at Scripps Institution of Oceanography, and 18 co-authors presented a worldwide examination of shifting baselines, exploring the idea that "humans have been disturbing marine ecosystems since they first learned how to fish." Kelp forests, coral reefs, tropical and subtropical seagrass beds, and estuarine oyster beds are all scrutinized, and the short- and long-term effects of overfishing examined. Those effects, the scientists conclude, "are synergistic, so that the whole response is much greater than the sum of individual disturbances." And there is a time lag, typically, between the onset of fishing and a noticeable collapse in stocks or environmental health.

Complexity and, especially, time: these are masks that hide change from view. Baselines, reference points for measuring the health of ecosystems, shift without our noticing. That means that many ecological models, which supposedly relate to "natural" conditions, were almost certainly programmed from erroneous starting points, starting points much closer to present-day conditions than to conditions that held even 100 years ago, much less before Europeans came along with their fancy boats and fishing nets.

Jackson, who has spent over three decades exploring Caribbean coastal waters, says that "every ecosystem I've studied is unrecognizably different from when I started." And that's in only 30-odd years. The turtlegrass beds he first encountered as a young researcher, for instance, flowing meadows of foot-high, emerald-green grass, looked healthy enough from a distance. But one thing missing from the scene was turtles—as many as 40 million of them, Jackson estimates, based on colonial hunting records. "Even the smallest estimate for green turtles" in the 17th and 18th centuries, he notes, "exceeds the highest recorded wildebeest abundances in the Serengeti." And all these turtles chomped away, cropping the turtlegrass to a height of only



a few inches. This action kept the grass healthy and the organisms that depend on it thriving.

By the 19th century, however, green turtles had been largely eliminated from the Americas, hunted to excess for food. Today, in the absence of these natural lawn mowers, the turtlegrass grows long and the tops become rotten and covered by enrusting organisms. One of these is a slime mold that, in the 1980s, caused a vast die-off of turtlegrass beds in Florida Bay and the Gulf of Mexico.

Other, similar scenarios have played out in oceans worldwide. The consequences are potentially huge, yet relatively little scientific study of historic processes has been done. "We are," observes Jackson, "more aware of the mass extinction of large vertebrates at the end of the Pleistocene than what happened in coastal seas only a century ago."

Can we bring back millions of sea turtles? No. Can we do *anything?* Of course.

Part of the answer involves understanding just how far our baselines have shifted—and ceasing, or seriously modifying, destructive practices before we find ourselves eating plankton soup. To continue to believe that wild coastal fisheries are sustainable, for example, is foolhardy, both Jackson and Pauly believe. Rather than perpetuating that myth, Jackson writes, "scientific efforts should be redirected toward evaluating options for restoration of resources. . . . It is hard to imagine how increasingly sophisticated and frequent environmental monitoring and micromanagement could do a fraction of the good of simply stopping fishing."

Stopping fishing is far from simple, though. And taking a single action, in any case, is never sufficient. In addition to overfishing, impacts on the health of ocean waters include pollution, coastal development, and global warming. The web of influences is complex, and remedies must be similarly multifaceted.

The shifting baselines concept feeds into this complexity, giving concerned parties—scientists, conservationists, policymakers, or citizens—new hope (a new baseline, if you will) for what can be done. By understanding what once existed, we can plan better for what might again be possible.

I spoke with Jeremy Jackson by phone recently, and will let his words round out this overview.

What is your opinion about the new decision regarding marine protected areas off California, setting aside some 18 percent of coastal waters?

Jeremy Jackson: I get uncomfortable when people talk only about marine protected areas, because I think marine protected areas make more sense in some situations than they do in others. [Jackson did say earlier in our conversation, however, that anything less than 30 percent protected area, as Australia has allotted for the Great Barrier Reef Marine Park off Queensland, is probably inadequate to bring about real change.] Certainly it's the case that not killing fish is good for fish, so if you have areas that are in effect sanctuaries, that's going to do a lot of good. But for something like the California sardine, it makes a lot more sense to think about water bodies, and about adaptive management where you change the rules based on climatic trends and other variables.

So every fishery is going to have a lot more going on than just how many fish are caught.

JJ: Inevitably, because the world is a very variable place. Maximum sustainable yield, for example—it's a silly idea. If you calculate numbers ignoring the fact that environments go up and down, you're in trouble.

A former student at Scripps, David Field, published this really cool paper in *Science* this year. He studies planktonic foraminifera, those little calcareous things that float around at the surface

of the ocean. We know a lot about them because they're how we tell time in ancient rocks and they also tell us a great deal about the environment. David showed from a 1,300-year record from the Santa Barbara Basin that tropical and subtropical species are now moving into the California Bight, and temperate and north temperate species are becoming much less abundant. And all of this started big-time in the 1960s. The point of that, of course, is that environments are changing in systematic ways that are very different from anything in the previous 1,300 years. So on top of all the other uncertainties, we have this new uncertainty. Which is one of the reasons that a flexible management program that includes in its toolkit protected areas, catch restrictions, seasonal closures, and geographic flexibility to move protected areas over time makes so much sense.

But all of this requires trust. That's why I've been turned off by the situation in California [over the establishment of marine protected areas], where all these people are screaming at each other and not listening. Because if we don't have dialogue and if we don't show respect for each other and trust each other, then we're just going to keep screaming. And that's not a good way to manage anything.

We are more polarized on these environmental issues in this country than any place I've ever been. And we don't have a lot of respect for the winner. We get nasty and vindictive. It's spooky.

The baselines are changing in every way. It's not just natural populations. It's also the economic environment we live in, the social environment we live in, and the climate we live in. Under those circumstances you've got to keep your eyes open and be flexible, and above all pay attention: take things seriously. Hopefully, that's what will emerge finally in California.

In a strange way, just the way it was Nixon who went to China, in California, Schwarzenegger can do a lot of good for the environment. Because he can laugh at himself and his Hummers and then say, "But I support this," and then get a lot of attention. He doesn't make the policies, but he's a smart enough politician to listen. And we need more like that. Especially in this day and age, what the states do is all-important. What I'd like to see people who lobby and work on this stuff say to the governor on a regular basis is, be as much of a leader on this as you're being about climate change, and you'll go down in history as the most environmentally conscious governor in the history of the United States.

"This" being coastal water management?

JJ: Yes, all of it, the whole thing about how we manage our coasts. This state is really interesting in this regard, because it's hard to think of a state other than Florida or maybe Maine that makes as much of its income out of nonextractive uses of the water. Recreational use is an enormous business in this state.

You know, I've never been on a surfboard in my life, and I'm sure I never will be, at the age of 63, but I've worked quite closely with the Surfrider Foundation, because they get it. Those are potentially powerful organizations.

And what is the Surfrider Foundation doing?

JJ: What got them interested in all of this is, A, they don't like dirty-looking beaches, and B, they *really* don't like getting hepatitis. And they really don't like not being able to go in the water after it rains. And basically, from Santa Barbara south, if it's been dry awhile and it rains, they shouldn't go in the water. But in [dealing with these issues], they pick up on the other stuff.

And then there's groups like World Wildlife Fund, which is big on sustainable fisheries. What they're really good at is dealing with the corporate world quietly and effecting change that way. They're the prime movers on sustainable forestry, and they're working to do the same thing with fisheries. It's an important approach, but it's not the only approach. Sort of a mix of World Wildlife Fund and Greenpeace makes a lot of sense, I think, because it's almost a good cop, bad cop approach—and they talk to each other. They'd never admit it, but they talk to each other all the time.

And then there's the Nature Conservancy, and Environmental Defense. There was a big article in the *New York Times* business section about a deal TNC has brokered with the trawl fishers on the central California coast. [For more on this, see the earlier "Reinventing a Local Fishery on the Morro Bay Waterfront," *Coast & Ocean,* Autumn 2005.] Basically, they're buying out the licenses, and then they're going to retire them. That gets pretty close to TNC owning half of all the licenses in California—which is a huge investment, but it's a really smart strategy.

So most organizations are involved. In any movement, though, there's a lot of rhetoric, and there's a lot of striving to be the most important group, and to get the most publicity and attention. It's one of the things that offends me about

What If?

MOST OF US LEARNED, probably in school, that when the early European explorers began traversing this continent, they encountered untold riches of wildlife: vast herds of shaggy buffalo roamed the western plains; waterbirds flocked to West Coast estuaries in such numbers that they darkened the sky. The wealth of the land was unimaginable! And it had always been so—until the Europeans came.

Well, not necessarily.

In a fascinating book, *1491: New Revelations of the Americas before Columbus* (Knopf, 2005, 480 pp., $30 hard cover, $14.95 paper), Charles C. Mann, a journalist, puts such long-held, cherished assumptions to the test. He mines learned opinion and solid knowledge from ecologists, archeologists, historians, epidemiologists, and other scholars to piece together an alternate vision of what life was like in the Western Hemisphere before Europeans came along.

One of Mann's conclusions is that the "pristine wilderness"—vast, abundant, untamed—is about as mythical as the solitary frontiersman who pitted brawn and wits against all that wildness to civilize the land. That job of taming had been done long before, by the native inhabitants. At the time of Columbus's voyages of exploration, agriculture was practiced in as much as two-thirds of what is now the continental United States. Large areas of the arid Southwest were terraced and irrigated, eastern forests had been replaced by fertile farms, and salmon nets stretched across virtually every river mouth of the Pacific Northwest. Everywhere, fire was a crucial management tool, and vast herds of anything were pretty much unheard of. Indians had profoundly altered the landscape by the early 16th century, when the first European explorers arrived.

Yet by the time the second wave of explorers began their push into the hinterlands more than a century later, the situation had changed dramatically. Where in 1540 the Spanish explorer Hernando de Soto had found lands "thickly set with great towns," in 1682 the Frenchman La Salle encountered, in the same areas, "a solitude unrelieved by the faintest trace of man." La Salle did, however, encounter bison, grazing in great herds along the Mississippi River—an extraordinary beast that de Soto would surely have mentioned had he seen one. A similar abundance marked the West Coast. When Sir Francis Drake sailed into San Francisco Bay in 1579, he noted, "infinite was the company of very large and fate Deere." And scarce was humanity—though according to archeological evidence, that had not been the case just a century before.

What happened? Disease brought to the Americas by the first explorers (and their livestock) is the quick answer. Mann explains why the Indians were so susceptible to European illnesses, which some scholars believe sent human populations plummeting by as much as 95 percent. The people ceased to be able to shape the land and manage its wildlife. Without regular culling for food and to protect fields of maize from trampling, bison, elk, and other animals multiplied and spread. Without fire management, forest succession proceeded rapidly. The "forest primeval" that we romantically picture covering much of this continent was in a sense created by the Europeans.

—*AC*

environmental organizations in general. They're not much different from BP when it comes to, "Look what World Wildlife did!" or "Look what Nature Conservancy did!" instead of "Look what *we* all did, and accomplished." Greenpeace might be the exception, because they're so radical; they don't think the same way.

But they are all making good changes that are politically driven, if not in the same way states' decisions are politically driven.

JJ: Well, except California could turn around. I think, at the end of the day, if we have to depend on NGOs [nongovernmental organizations], we're in deep trouble. I think it has to be fundamental social change. Why are people smoking less? It's not because they got put in jail or fined. And why do women genuinely have more parity—not total, but more than they used to? These are fundamental social changes.

Which got pushed by policy changes.

JJ: Yes. By social activism.

And the environmental groups are the harbingers.

JJ: Yes, though they used to be more. There used to be a time when five to ten million people showed up for Earth Day. I believe that almost universally, the environmental organizations have become too corporate, they've turned off youth. There's not just a conflict between left and right, and blue state and red state; there's an enormous conflict between everybody over 20 and everybody under 20. And none of the environmental organizations know how to reach those people.

The generation gap has gotten even stronger because of the acceleration of mass communication, and the fact that you used to have to listen to ABC or NBC, and now you have 300 choices. The president of the United States could come on television to tell us that we're being invaded by Martians *for real*, and he would get a 15 percent viewer audience.

So the ability to focus effectively has been dramatically eroded. And it's a much more populist society. Which is why somebody like Schwarzenegger, of all people, because he's savvy about those sorts of things, *can* be effective, much more so than other people who just don't understand.

The generation gap. A more populist society. Shifting baselines extend from marine conservation into the very heart of social change. One point that should not be forgotten is that we all need to listen to each other, and respect each other. Different groups will have different perspectives—different baselines. It's an ongoing dance, one we have to keep learning new steps to. Not fancy steps. Just ones that work. ■